OREGON WILD

Formerly Oregon Natural Resources Council (ONRC)

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5 May 2011

TO: Medford_Mail@blm.gov
ATTN: Stephanie Kelleher, Stephanie_Kelleher@blm.gov
CC: K. Norm Johnson, Jerry Franklin, Joseph Vaile

Subject: Oregon Wild scoping comments on Pilot Joe Timber Sale Project

Dear BLM:

Please accept the following scoping comments from Oregon Wild concerning the forthcoming Pilot Joe Timber Sale Project EA dated April 8, 2011. Oregon Wild represents about 7,000 members and supporters who share our mission to protect and restore Oregon's wildlands, wildlife, and water as an enduring legacy. Our goal is to protect areas that remain intact while striving to restore areas that have been degraded. This can be accomplished by moving over-represented ecosystem elements (such as logged and roaded areas) toward characteristics that are currently under-represented (such as roadless areas and complex old forest).

The proposed action alternative involves:

- 600 acres of treatments in the Middle Applegate Watershed
- Applying the Johnson/Franklin Restoration Principles

BLM's 4-8-2011 scoping letter provides very little information on what is actually proposed on the ground. A more informative scoping letter would be more helpful.

Please keep us informed of all future opportunities to learn about and comment on this project.

Please include in the final decision, an order to leave the untreated "large block" for a specified amount of time, so the large blocks do not get treated prematurely as part of some later project. Are the large block owl reserves established for this project adequate and appropriate at multiple scales considering the condition of non-federal lands and the lagging effects of past management?

General recommendations for fuel reduction thinning/restoration

1. When conducting commercial thinning projects take the opportunity to implement other critical aspects of watershed restoration especially reducing the impacts of the road system and livestock grazing and establishing the ecological processes that foster recovery of hydrologic systems and fire regimes. See FEMAT 1993. Appendix V-J: Guidelines for Restoration Projects (unnumbered pages between V-96 and VI-1). Bradbury, Nehlsen et al 1995. Handbook for Prioritizing Salmon & Watershed Restoration. http://pacificrivers.org/science-research/resources-publications/handbook-for-prioritizing-watershed-protection-and-restoration-to-aid-recovery-of-native-salmon This is also part of the Johnson/Franklin Restoration Principles: "Plan and implement restoration activities at larger landscape levels, encompassing the variety of restoration efforts that are needed within a landscape."

2. Use scarce resources efficiently by striving to restore ecological *processes* that can be self-sustaining. Recognize that insects and disease are natural ecological processes that actually help improve landscape diversity. Recognize that tree mortality recruits valuable habitat structures and makes resources available which increases the vigor of surviving trees, thus accomplishing many of the objectives of density reduction projects. Don't focus too much on *tree health*, but think instead about *forest ecosystem health*. Use natural processes where it makes sense to do so. Don't waste too much effort restoring forest *structure* when doing so will require continuous expenditure of money and effort to maintain. Reed F Noss, Jerry F Franklin, William L Baker, Tania Schoennagel, and Peter B Moyle. 2006. Managing fire-prone forests in the western United States. Front Ecol Environ 2006; 4(9): 481–487. http://spot.colorado.edu/~schoenna/images/Nossetal2006Frontiers.pdf Crist, M.R., T.H. DeLuca, B. Wilmer, and G.H. Aplet. 2009 Restoration of Low-Elevation Dry Forests of the Northern Rocky Mountains: A Holistic Approach. Washington, D.C.: The Wilderness Society.

3. Use this project as an opportunity to conduct monitoring and research on the effects of thinning and restoration. There are many information gaps that need filling. Every project should generate useful information to inform future projects.

4. Treated stands do not exist in isolation, so be sure to consider the effects of thinning on adjacent areas which may provide habitat for species of concern. Prepare a "risk map" based on proximity to different habitat types from high quality to non-habitat.

5. Only a small subset of needed restoration activities are "profitable," so we can't let logging economics determine restoration priorities. Consistent with Johnson/Franklin Restoration Principles: "Substantial investment will be needed. While timber harvest receipts can help defray costs, they will not be sufficient to cover all the actions needed…' If we restore primarily those areas that have commercial sized logs and fail to treat the thousands of acres of areas that need restoration but lack economic return, we will not be accomplishing real restoration which requires carefully and strategically choosing the subset of the landscape that can be treated to provide the greatest gain (both ecological and fire hazard reduction) for the least ecological "cost" in terms of soil, water, wildlife, carbon, and weeds. "Hoping to boost their economies and also restore these forests, local leaders are interested in the economic value of timber that might be available from thinning treatments on these lands. … [W]e found that on lands where active forestry is allowable, thinning of most densely stocked stands would not be economically viable." Rainville, Robert; White, Rachel; Barbour, Jamie,

tech. eds. 2008. Assessment of timber availability from forest restoration within the Blue Mountains of Oregon. Gen. Tech. Rep. PNW-GTR-752. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 65 p. http://www.fs.fed.us/pnw/pubs/pnw_gtr752.pdf
Allowing economics to drive these choices will result in greater ecological impacts and lower ecological gains. The NEPA analysis must honestly disclose what optimum restoration treatments would look like versus what is actually being proposed, so the public can see what ecological values being sacrificed in order to make the project economically viable.

6. Thinning should focus on areas accessible from existing roads. Building new roads will cause degradation that typically erases any alleged benefit of treatments.

7. Use the historic range of variability as a guide, but don't just focus on seral stage. Consider also the historic abundance of ecological attributes like large trees, large snags, patches of dense forest, roadless areas, etc. all of which have been severely reduced from historic norms. Also, consider the *natural* range of variability, which is the historic range of variability as modified by future climate change. James A. Harris, Richard J. Hobbs, Eric Higgs, and James Aronson. 2006. Ecological Restoration and Global Climate Change. Restoration Ecology Vol. 14, No. 2, pp. 170–176 JUNE 2006. http://www.globalrestorationnetwork.org/uploads/files/LiteratureAttachments/353_underlying-principles-of-restoration.pdf

8. Develop restoration treatments appropriate to each forest type or plant association group (PAG). Dry Ponderosa pine forests that have significant ingrowth due to fire exclusion are good candidates for thinning (but density reduction efforts must be harmonized with the needs of the spotted owl). Mixed-conifer forest types often included some dense forest patches, so they should be retained at appropriate scales.

9. Prioritize treating stands that are already degraded by past logging, and place less priority on treating unlogged forests. See Naficy, Cameron, Anna Sala, Eric G. Keeling, Jon Graham, and Thomas H. DeLuca. 2010. Interactive effects of historical logging and fire exclusion on ponderosa pine forest structure in the northern Rockies. Ecological Applications 20:1851-1864. http://rintintin.colorado.edu/~cana4848/papers/Naficy_et_al_2010_Ecol_App.pdf ("We document that fire-excluded ponderosa pine forests of the northern Rocky Mountains logged prior to 1960 have much higher average stand density, greater homogeneity of stand structure, more standing dead trees and increased abundance of fire-intolerant trees than paired fire-excluded, unlogged counterparts. Notably, the magnitude of the interactive effect of fire exclusion and historical logging substantially exceeds the effects of fire exclusion alone. These differences suggest that historically logged sites are more prone to severe wildfires and insect outbreaks than unlogged, fire-excluded forests and should be considered a high priority for fuels reduction treatments.")

10. Prioritize treating dry forest types at low elevation and on south slopes. Treatments in forests with naturally mixed-severity fire regimes should be carefully scrutinized to ensure those areas (i) are in fact outside of the HRV, and (ii) treatment will not remove scarce habitat for focal species that depend on dense forests, and (iii) treatments are in fact needed and (iv) proposed treatments will be effective.

Treatments in mixed severity fire regimes should be more patchy and leave behind more structure, more snags and large dead wood.

11. New evidence indicates that far more of the “dry” forests, rather than being typified low severity fire regimes, were in fact dominated by mixed severity fire regimes (including significant areas of stand replacing fire), so mixed severity fire is an important part of the historic range of variability that should be restored. The goal should NOT be a uniform low severity fire regime, but rather a wide mix of tree densities in patches of varying sizes. This objective can often be met by allowing natural fire regimes to operate, or by leaving significant areas untreated when planning fuel reduction projects. Hessburg, Paul. Evidence for the Extent of Mixed Severity Fires in Pre-Management Era Dry Forests of the Inland Northwest. Proceedings: Mixed Severity Fire Regimes: Ecology and Management. November 17–19, 2004. Spokane, Washington. http://www.sustainablenorthwest.org/bmfp/hessburg__salter__james_paper_11.pdf; Baker, W.L., T.T. Veblen and R.L. Sherriff (2006). Fire, fuels, and restoration of ponderosa pine-Douglas-fir forests in the Rocky Mountains, USA. Journal of Biogeography. 2006.

12. Treatments in the wildland urban interface may also be a priority, but don’t define the WUI too broadly, because fire hazard can be reduced by treating the area immediately adjacent to structures and this “home ignition zone” is usually on non-federal lands. Fire is an important ecological process that needs to be restored on public lands, so the WUI fire problem should be framed as a home-ignition problem and the solution for that lies with the private property owners. Cohen 2008. The Wildland-Urban Interface Fire Problem – A Consequence Of The Fire Exclusion Paradigm. Forest History Today. Fall 2008. http://www.foresthistory.org/Publications/FHT/FHTFall2008/Cohen.pdf Fuel treatments in the WUI should be coupled with efforts to make communities fire resilient, not just to facilitate fire suppression.

13. Prioritize treatment of dense young stands that are most "plastic" and amenable to restoration. Another priority is to carefully plan and narrowly target treatments to protect specific groves of fire-resistant, old-growth trees that are threatened by ingrowth of small fuels, but don’t focus on rigid density reduction targets. Leave all medium and large trees that show old-growth characteristics.

14. Thin from below, retaining the largest trees, or use “free thinning” with a diameter cap so that some trees of all size classes are retained. Retain all large trees and most medium sized trees so they can recruit into the larger classes of trees and snags.

15. Identify and retain all trees with old-growth characteristics even if they are less than 21” dbh. Old growth characteristics include thick bark, colored bark, flat top, asymmetric crown, broken top, forked top, relatively large branches, etc. These trees have important habitat value and human values regardless whether they are 21” dbh. Allow natural processes of succession and mortality turn some of these medium and large trees into ecologically valuable snags and down wood. The agencies often use this technique to identify and retain old-growth juniper trees and the same can be used to protect old growth pine, larch, Douglas fir and other species. Van Pelt, R. 2008. Identifying Old Trees and Forests In Eastern Washington. Washington DNR. http://www.dnr.wa.gov/Publications/lm_ess_eastside_oldgrowth_guide.pdf. A recent study supports the retention of slow growing old trees because they are relatively more resilient. The study found that slower-growing older trees tend to channel their energy

into structural support and defense compounds to "maximize durability while minimizing … damage". Colbert & Pederson. 2008. Relationship between radial growth rates and lifespan within North American tree species. Ecoscience 15(3), 349-357 (2008). http://www.ecoscience.ulaval.ca/catalogue/FA3149-black.pdf. See also. Tobias Züst, Bindu Joseph, Kentaro K. Shimizu, Daniel J. Kliebenstein and Lindsay A. Turnbull, Using knockout mutants to reveal the growth costs of defensive traits, in: Proceedings of the Royal Society B, 2011, Jan. 26, doi:10.1098/rspb.2010.2475.

16. Use diameter limits as a tool because it provides a useful means to prevent economic values from trumping ecological values. It is often appropriate to use lower diameter limits for fire tolerant species like Ponderosa pine and Douglas fir, while using higher limits for fire intolerant species like grand fir/white fir. The exceptional circumstances in which diameter limits allegedly don't work, are more rare than the circumstances in which refusing to use diameter limits will lead to unintended consequences, including removal of ecologically valuable trees and lack of public trust.[1]

17. Recognize that thinning affects fire hazard in complex ways, including some tendencies to make fire hazard worse. The agency must address the fact that thinning creates slash; moves fine fuels from the canopy to the ground (increasing their availability for combustion); thinning increases ignition risk (by increasing human access and human activities, including spark-generating machinery); thinning makes the forest hotter-dryer-windier; and makes site resources available to stimulate the growth of future surface and ladder fuels. Amy E.M. Waltz, Peter Z. Fulé, W. Wallace Covington, and Margaret M. Moore. 2003. Diversity in Ponderosa Pine Forest Structure Following Ecological Restoration Treatments. Forest Science 49(6) 2003. http://www.globalrestorationnetwork.org/uploads/files/LiteratureAttachments/91_diversity-in-ponderosa-pine-forest-structure-following-ecological-restoration-treatments.pdf; Kaufmann M.R., G.H. Aplet, M. Babler, W.L. Baker, B. Bentz, M. Harrington, B.C. Hawkes, L. Stroh Huckaby, M.J. Jenkins, D.M. Kashian, R.E. Keane, D. Kulakowski, C. McHugh, J. Negron, J. Popp, W.H. Romme, T. Schoennagel, W. Shepperd, F.W. Smith, E. Kennedy Sutherland, D. Tinker, and T.T. Veblen. 2008. The status of our scientific understanding of lodgepole pine and mountain pine beetles – a focus on forest ecology and fire behavior. The Nature Conservancy, Arlington, VA. GFI technical report 2008-2. http://www.fs.fed.us/r6/umpqua/projects/projectdocs/d-bug-ts/lpp-mpb-fire-2008-status-of-science-unillustrated-version-kaufmann-et-al.pdf. Fuel reduction must find the "sweet spot," by removing enough of the small surface and ladder fuels while retaining enough of the medium and large trees to maintain canopy cover for purposes of microclimate, habitat, hydrology, suppression of ingrowth, etc.

18. Fire-regime condition-class may not be an accurate predictor of fire hazard, because it assumes incorrectly that time-since-fire is an accurate indicator of fire hazard. There is compelling evidence that time-since-fire has exactly the opposite of the assumed effect, that is, fires may burn more severely in early seral vegetation, and burn less severely in closed canopy forests. This may be related to the fact that closed canopy forests maintain a cool-moist microclimate that helps retain higher fuel moisture and more favorable fire behavior. Odion, D.C., E.J. Frost, J.R. Strittholt, H. Jiang, D.A. DellaSala

[1] The Deschutes National Forest used a sensible approach on the Lava Cast Project using a 21" diameter cap for lodgepole, 18" diameter cap for white fir, a 16" diameter cap for Ponderosa pine where the average diameter is the stand is below 12", and 18" diameter cap for Ponderosa pine where the average diameter of the stand is larger than 12 inches. Lava Cast DN. Feb 2007.

and M.A. Moritz. 2004. Patterns of fire severity and forest conditions in the western Klamath Mountains, California. Conservation Biology 18(4): 927-936. http://nature.berkeley.edu/moritzlab/docs/Odion_etal_2004.pdf Canopy cover also helps suppress the growth of ladder fuels. The practical significance of this is that the agency, when thinning, should retain more canopy variably across the stand and should not focus on treatment of canopy fuels except to provide some well-spaced "escape hatches" for hot gases generated by surface fires. Credible models of post-thinning fire behavior, must account for both fuel structure and microclimate effects of thinning.

19. There is growing evidence that in order to be effective, mechanical treatments must be followed by prescribed fire. But the effects of such fires must also be carefully considered. Fuel treatments without regular follow-up treatments might be worse than doing nothing at all because thinning can be expected to stimulate the growth of future surface and ladder fuels. Crystal L. Raymond. 2004. The Effects of Fuel Treatments on Fire Severity in a Mixed-Evergreen Forest of Southwestern Oregon. MS Thesis. http://depts.washington.edu/nwfire/publication/Raymond_2004.pdf; Jonathan R. Thompson, Thomas A. Spies 2009. Vegetation and weather explain variation in crown damage within a large mixed-severity wildfire. Forest Ecology and Management 258 (2009) 1684–1694. Therefore retain plenty of canopy cover to suppress the growth of those future fuels and as insurance against the very real possibility that follow-up fuel treatments may not be adequately funded and implemented.

20. Don't thin to uniform spacing. Use variable density thinning techniques to establish a variety of microhabitats, break-up fuel continuity, create discontinuities to disrupt the spread of other contagious disturbances such as disease, bugs, weeds, fire, etc. Retain patchy clumps of trees which is the natural pattern for many species.

21. Be creative in establishing diversity and complexity both within and between stands. "Patchy, gappy, and clumpy" is often use to describe the distribution of trees in dry forests. Use skips and gaps within units to help achieve diversity. Gaps should be small, while skips should be a little larger. Landings do not make good gaps because they are clearcut (i.e., lack structure), highly compacted and disturbed, more likely subject to repeated disturbance, and directly associated with roads. Gaps should be located away from roads and should not be clearcut but rather should retain some residual structure in the form of live or dead trees.

22. Thin heavy enough to stimulate development of some patches of understory vegetation, but don't thin so heavy that future development of a uniform understory becomes a more significant fuel problem than the one being addressed by the current project. 15-20 years after thinning and prescribed fire, the Umpqua NF found "considerable development of less fire tolerant understory vegetation …. Continued stand development … will result in increased understory density and and fuel laddering into the dominant fire tolerant overstory…" Umqua NF, Dimaond Lake RD, Lemolo Pine Health Maintenance Burn Project, June 1, 2010 scoping notice.

23. The scale of patches in variable density thinning regimes is important. Ideally variability should be implemented at numerous scales ranging from small to large, including: the scale of tree fall events; pockets of variably contagious disturbance from insects, disease, and mixed-severity fire; soil-property heterogeneity; topographic discontinuities; the imprint of natural historical events; etc.

24. Retain and protect under-represented species of conifer and non-conifer trees and shrubs. Retain patches of dense young stands as wildlife cover and pools for recruitment of future forests.

25. Recognize that thinning captures mortality and that most stands (especially plantations) are already lacking critical values from dead wood due to the unnatural stand history of logging, planting, and disrupted natural processes.[2] To inform the decision, please conduct a stand simulation model showing that long term snag recruitment (after logging) will still meet DecAID 50-80% tolerance levels.

26. Retain abundant snags and course wood and green trees for future recruitment of snags and wood. Retention should be both distributed and in clumps so that thinning mimics natural disturbance. Retention of dead wood should generally be proportional to the intensity of the thinning, e.g., heavy thinning should leave behind more snags not less. Retain wildlife trees such as hollows, forked tops, broken tops, leaning trees, etc. Think not only about existing snags but more importantly about the processes the recruit snags, including: a large pool of green trees from which to recruit snags and the existence of competition and other mortality processes. Logging will significantly harm both of these snag recruitment factors. Recognize that thinning captures mortality. To inform the NEPA decision, please conduct a stand simulation model to fully disclose the adverse effects of logging on dead wood, especially long-term recruitment of large snags >20" dbh, and then mitigate for these adverse effects by identifying areas within treated stands and across the landscape that will remain permanently untreated so they can recruit adequate large snags and dead wood to meet DecAID 50-80% tolerance levels as soon as possible and over the long-term.

27. If using techniques such as whole tree yarding or yarding with tops attached to control fuels, the agency should top a portion of the trees and leave the greens in the forest in order to retain nutrients on site.

28. Avoid impacts to raptor nests and enhance habitat for diverse prey species. Train marking crews and cutting crews to look up and avoid cutting trees with nests of any sort and trees with defects.

29. Take proactive steps to avoid the spread of weeds. Avoid and minimize soil disturbance. Retain canopy cover and native ground cover to suppress weeds.

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[2] Tom Spies made some useful observations in the Northwest Forest Plan Monitoring Synthesis Report: "Certainly, the growth of trees into larger diameter classes will increase as stand density declines (Tappeiner and others 1997). At some point, however, the effect of thinning on tree diameter growth levels off and, if thinning is too heavy, the density of large trees later in succession may be eventually be lower than what is observed in current old-growth stands. In some cases, opening the stand up too much can also create a dense layer of regeneration that could become a relatively homogenous and dominating stratum in the stand. Furthermore, if residual densities are too low, the production of dead trees may be reduced (Garman and others 2003). Thinning should allow for future mortality in the canopy trees." http://www.reo.gov/monitoring/10yr-report/documents/synthesis-reports/index.html

30. Buffer streams from the effects of heavy equipment and loss of bank trees and trees that shade streams. Mitigate for the loss of LWD input by retaining extra snags and wood in riparian areas. Recognize that thinning captures mortality that is not necessarily compensated by future growth.[3]
31. Protect soils by avoiding road construction, minimizing ground-based logging, and avoiding numerous large burn piles. Rank new road segments according to their relative costs (e.g. length, slope position, soil type, ease of rehabilitation, weed risk, native vegetation impacts, etc.) and benefits (e.g. acres of restoration facilitated), then use that ranking to consider dropping the roads with the lowest ratio of benefits to costs. Once you have determined the relative acres accessed per mile of road construction, you can take the analysis one step further, to determine the "effective road density" of each segment? In other words, extrapolate as if that much road were required to reach each acre of the planning area, then compare the resulting road density to standards for big game, cumulative hydrological impact, etc? For example, if a new spur road accesses thinning opportunities at a rate of 200 acres of forest per mile of road, then divide 640 acres per section by 200 acres per mile to determine the effective road density of 3.2 mi/mi^2. Where road building is deemed necessary, ensure that the realized restoration benefits far outweigh the adverse impacts of the road, build the roads to the absolute minimum standard necessary to accomplish the job, and remove the road as soon as possible to avoid firewood theft, OHV trespass, and certainly before the next rainy season to avoid stormwater pollution. Do not allow log hauling during the wet season.
32. There is a carbon cost associated with thinning that must be disclosed and considered. As stands develop from young to mature to old, they continuously recruit carbon-rich material from the live tree pool to the dead wood pool. Some of that wood gets incorporated into the soil or falls in fire refugia where it can accumulate. Logging, even thinning, can dramatically affect the accumulation of carbon in the dead wood pool by capturing mortality, diverting it from the forest, and accelerating the transfer of carbon to the atmosphere. Carbon stays out of the atmosphere much longer if it remains in the forest as live and/or dead trees, instead of being converted to wood products and industrial and consumer waste.
33. If this project involves biomass utilization, the impacts need to be clearly disclosed. How will the biomass be moved from the remote corners of the treatment areas to the landings? Will there be extra passes made by heavy equipment? Will the landings be enlarged to make room for grinders, chip vans, and other equipment? Can the local forest roads accommodate chip vans? Will the roads be modified to make them passable by chip vans? What are the impacts of that? What are the direct, indirect, and cumulative impacts on soil, water, wildlife, and weeds?

[3] "[T]he data have not supported early expectations of 'bonus' volume from thinned stands compared with unthinned. … [T]hinnings that are late or heavy can actually decrease harvest volume considerably." Talbert and Marshall. 2005. Plantation Productivity in the Douglas-fir Region Under Intensive Silvicultural Practices: Results From Research And Operations. Journal of Forestry. March 2005. pp 65-70. *citing* Curtis and Marshall. 1997. LOGS: A Pioneering Example of Silvicultural Research in Coastal Douglas-fir. Journal of Forestry 95(7):19-25.

34. Acknowledge and consider the following potentially significant issues in the NEPA analysis:

    a. Removing commercial sized logs, and associated roads and slash disposal, often conflicts with other resource values such as soil, water, weeds, wildlife habitat, fire hazard, and carbon storage;

    b. Removal of commercial sized logs can make the stand hotter, dryer, and windier, making fire hazard worse instead of better;

    c. Commercial logging tends to present significant risks of weed infestations because of soil disturbance and canopy reduction;

    d. Removal of commercial logs necessitates road related impacts on soil and water resources. Machine piling and pile burning tend to cause significant adverse impacts on soil and water, especially when combined with road impacts and other logging disturbances.

    e. "Capturing mortality" reduces future snag habitat that is already deficient. Increasing vigor via thinning delays recruitment of snag habitat that is already deficient;

    f. The unavoidable adverse impacts of logging and roads must be balanced against the rather uncertain benefits of fuel reduction. Fuel reduction has little or no beneficial effect on low severity fires (controlled by favorable weather conditions) or on high severity fires (controlled by unfavorable weather conditions). There is actually a very low probability that moderate intensity fire will affect any given stand during the relatively brief time period that fuel hazard is alleged to be reduced. Please disclose the realistic probability that desired outcomes will occur based on (1) whether fire is likely to occur when the fuel treatments are likely to be effective, and (2) if fire does occur, whether there will be a good match between (A) the actual forest type and fuel treatment type, and (B) the actual probability of favorable weather conditions and fire conditions for that forest type and treatment type. Depending on these variables, fuel treatments may have little influence on both low intensity fire and extreme high intensity fire, leaving only a small subset of well-matched fuel treatments and fires, and a low probability that the proposed treatments will have ecological benefit s that exceed ecological impacts.

    g. The effects of forest health thinning are very complex with many feedback loops. There is still a fair amount of scientific uncertainty about several critical factors relevant to a decision about fuel reduction, including: (A) uncertain rates of tree mortality and how many young trees need to be retained to ensure proper recruitment of future stands of old trees and large snags; (B) uncertainty about how much the canopy can be reduced without making the stand hotter, dryer, and windier (and exacerbating fire hazard); (C) uncertainty whether logging has any significant beneficial effect on controlling insects and diseases like mistletoe.

    h. The agency must test the assumption that fire (and insect) risk reduction is compatible with ecological restoration objectives. This test must be spatial, probabilistic, and use reasonable assumptions about weather, fire frequency, fire suppression, and historic conditions in areas with variable-severity fire regimes. Sensitivity analysis should test the robustness of assumptions and conclusions. Example analyses can be found in the literature, e.g. Rutherford V. Platt, Thomas T. Veblen, and Rosemary L. Sherriff. 2006. Are Wildfire Mitigation and Restoration of Historic Forest Structure Compatible? A Spatial Modeling Assessment. Annals of the Association of American Geographers, 96(3), 2006, pp. 455–470. http://www.colorado.edu/geography/class_homepages/geog_4430_f10/Platt%20et%20al_Wildfire%20Mitigatnion_AnAAG_2006.PDF, *and* R. V. Platt, T. T. Veblen, and R. L. Sherriff. 2008. Spatial Model of Forest Management Strategies and Outcomes in the Wildland–Urban Interface Natural Hazards Review, Vol. 9, No. 4, November 1, 2008. DOI:10.1061/(ASCE)1527-6988(2008)9:4(199) http://public.gettysburg.edu/~rplatt/Platt%20et%20al._NatHazReview08.pdf ("The results point toward several ways to guide current management practices in the study area. First, prioritizing land at the lowest elevations leads to the selection of the most land where both wildfire mitigation and restoration of historical forest conditions are needed. When thinning is restricted to Forest Service land, less land is selected where both goals are needed under all parameter scenarios. This is because Forest Service land tends to be at higher elevations and comprises forest types that are within the HRV. … Prioritizing the stands with the highest canopy cover decreases the percentage of selected land where both outcomes are needed…. Many of the stands where restoration of historical forest conditions is needed are open canopy and located on south facing slopes and at lower elevations. In contrast, many closed canopy stands are often located at higher elevations and on north-facing slopes where restoration of historical forest conditions is not needed.")

Comments on the Johnson/Franklin Restoration Principles:

Having reviewed Johnson & Franklin 2009. Restoration of Federal Forests in the Pacific Northwest: Strategies and Management Implications. http://www.cof.orst.edu/cof/fs/PDFs/JohnsonRestoration_aug15_2009.pdf, we offer the following comments that are relevant to this project:

The Johnson/Franklin Restoration Guidelines are NOT a spotted owl recovery plan, nor do the principles adequately address several significant new issues that must be factored into management under the NWFP, such as:

- the need to retain additional suitable owl habitat in order to mitigate for the invasion of the barred owl and increase the chances that the two owls can co-exist instead of competitively exclude each other;
- the need to protect additional habitat in order to store carbon and mitigate for global climate change;
- the "potential population" methodology for managing snag habitat is discredited and outdated. There is a need to retain additional medium and large trees in order to meet long-term objectives for snag and dead wood and mitigate for the sever shortage of those habitat features across the landscape;

- the need to retain existing suitable owl habitat as insurance against natural disturbance processes, and the recognition that the effects of logging plus natural disturbance are likely worse than the effects of natural disturbance alone.

The overarching objectives of the Johnson/Franklin report are ecological restoration and timber production, but these two goals are often in conflict and they are not well integrated in the restoration principles. The report says that logging will help pay for restoration and will "increase harvest levels on federal forests," but the report is not clear to what extent ecological values are sacrificed to achieve timber objectives/outcomes. In discussing the 21" diameter cap, the authors acknowledge that economic incentives can conflict with restoration goals. ("Because of their economic value, you can be sure they [old pine trees] will be harvested in density treatments if allowed.") Even their version of "ecological forestry" includes timber volume as an objective. "ecological forestry, … with many objectives including: … often, (5) commercial wood harvest …" Mixed objectives often lead to a situation where economic interests prevail over ecological interests. There is a long history of problems with this in Oregon forestry.

The report makes no attempt to determine under what circumstances logging dry forests to reduce the threat of "ecologically damaging wildfire" will result in net benefits to late successional habitat. The analysis of "scale of effort" assumes without question that the effects of fire are worse than then habitat effects of logging. The report asks the wrong question – how much do we need to treat to reduce fire hazard; instead of – under what circumstances will the cumulative impacts of logging at the scale needed to reduce fire, plus the effects of wildfire (recognizing that fire cannot be entirely controlled) cause net beneficial impacts compared to the impacts of natural disturbances alone? Answering this question will require a probabilistic risk assessment comparing the effects of logging and fire under various management approaches. For example: Heiken, D. 2010. Log it to save it? The search for an ecological rationale for fuel reduction logging in Spotted Owl habitat. Oregon Wild. V 1.0. May 2010. http://dl.dropbox.com/u/47741/Heiken%2C%20Log%20it%20to%20save%20it%20v.1.0.doc In some forest types the spotted owl and other species that prefer dense forests will benefit from risk reduction treatments, and in other forest types they will not benefit. This report leaps to a premature conclusion that mixed forest types are appropriate for treatment. However, if we apply a rigorous risk assessment framework we are likely to discover that treatment of mixed-severity forest types with intermediate or longer fire return intervals are unlikely to yield net benefits for wildlife that depend on dense forests, and complex dead woody structure.

Johnson/Franklin lump mixed-severity fire regimes, with "dry" forests based on concerns about climate change. This is unfounded and premature. Climate change adaptation and mitigation should not trump, but rather be harmonized with other priorities such as spotted owl habitat conservation. Mixed forests need special consideration, such as greater retention of dead wood and recruitment trees, and treatment of a much smaller fraction of the landscape. By lumping dry and mixed forests, the report does not follow it's own advice that "Policies and practices must respect the immense diversity in forest conditions that exist…" One can make a compelling argument that mixed forests should be lumped with moist because (1) left untreated they would better mitigate for the general shortage of spotted owl habitat, and (2) the cessation of native burning practices and the continuation of fire suppression policies indicate that the future fire regimes are more likely to resemble moist forests than dry forests.

The report does not give forest ecosystems credit for their inherent adaptability and resilience to climate change. Oregon forests have evolved with seasonal and decadal drought as well as periodic insects and fire events. Climate change may increase the frequency and severity of these events, but these are not novel processes in our forests. The ecological effects of climate change are still minor compared to the cumulative legacy effects of past and present logging, grazing, roads, weeds, and fire suppression. Furthermore, most of the stresses caused by climate change (e.g., drought, insects, fire) result in natural reductions in tree density which increases the vigor of remaining trees and produces habitat heterogeneity, i.e. self-correcting mechanisms are at play. Even large disturbances can help forests adapt to climate change by creating opportunities for change and shifts to ecosystems better adapted to the changing climate. Reducing small fuels may be warranted on the driest sites where restoration of fire frequent regimes is most likely, but from a habitat perspective, fuel reduction may not be warranted in mixed forests or where fire suppression policies are likely to persist.

The dry forest strategy is overly focused on perpetuating large trees rather than the full suite of ecological structures, functions, and processes. "'restoration' … include[s] the following considerations: retention of all old trees and focused silvicultural activities around these trees to enhance their potential for survival by reduction of fuels and competing trees and other vegetation …" Elsewhere the report says "A primary goal in ecological forestry is to create structural complexity and spatial heterogeneity. Stimulating the creation of 'decadence'—such as snags and logs and other woody debris on the forest floor, and wood decay in living trees—is also a common objective of silvicultural activities in ecological forestry." and "Coarse wood in the form of downed boles are important structural elements of all natural forest stands, … such logs will typically persist for several centuries as they undergo gradual decay and serve numerous functions, including critical habitat for the majority of animal species" but the report does not clearly acknowledge that commercial logging, both regen and thinning, capture mortality and reduce structural complexity and decadence.

The authors also call for "provision for denser untreated patches" but also recommend aggressive treatment of existing habitat for spotted owls and other species that prefer dense forests. The report fails to offer quantitative tools to help determine the appropriate scale and spatial arrangement of treated and untreated areas, other than "Incorporate ecologically appropriate spatial complexity, including both open and denser forest patches at both the stand and the landscape level;" Identifying the appropriate mix of open and dense forests at multiple scales is among the most critical issues of landscape conservation. E.g., "managing for a lower percentage [of dense forest] in landscapes dominated by the driest forest types and somewhat higher [percentage of dense forest] in landscapes dominated by the Moist Forest habitats;" "This [landscape approach] will include leaving some larger patches of dense forest in dominantly Dry Forest landscapes, such as may be required to provide habitat for the Northern Spotted Owl and its prey species."

The report assumes that Ponderosa pine and Douglas-fir PAGs in the Klamath Provinces will behave like those on the eastside. However, this fails to account for (1) the shortage of owl habitat in the checkerboard, and (2) the expectation of continued fire suppression in the checkerboard. The 2008 Final Recovery Plan for the spotted owl assumed that more dense forests could be sustained on federal lands in SW Oregon where fire suppression is expected to continue. Instead, this report erroneously assumes that the checkerboard is largely WUI and in need of treatment for that reason. The report fails to focus WUI treatment on the structure ignition zone, and inappropriately manages for the historic fire return interval (a more frequent fire regime that will likely never see again) instead of the *de facto* fire return interval (relatively less frequent and less in need of treatment).

It appears Johnson/Franklin would also leave only 1/3 of the dry BLM lands in dense forests/owl habitat, without acknowledging the fact that the non-federal half of the checkerboard lacks adequate owl habitat. Most of the treatments would be temporally front-loaded which would be risky in light of the current status of the owl. "[W]e modeled entry into 40% of the area that might be considered for timber harvest over the next 20 years (20% of the entire Dry BLM forest). Thus, we conclude that the Dry Forest strategy might provide 40 million feet/year over the next 20 years. We advocate this cautious approach due to the uncertainties about ecological restoration of this complex landscape."

It is unclear why fire hazard must be reduced within existing owl habitat, instead of focusing on existing plantations on federal and non-federal lands which present an even greater fire hazard. <u>It is logically inconsistent to tolerate high fire hazard in the form of dense young stands on private land while being intolerant of the fuels needed to maintain high quality spotted owl habitat on federal land.</u> If we can tolerate fire hazard associated with plantation forestry, then we can tolerate fire hazard associated with spotted owl habitat.

The management prescriptions are appropriately concerned about protecting existing old forest structure but they do not adequately address the need to retain additional trees in order to recruit *future* old trees and ongoing *recruitment* of dead wood to meet habitat objectives.

The Report has a good discussion of the value of dead wood after disturbance …

> "Concerns with the removal of standing dead and down trees, collectively known as coarse wood, include the numerous ecological roles that it plays in forest ecosystems (Harmon et al. 1986, Maser et al. 1988) including roles as:
>
> > • Long-term sources of energy and nutrients;
> >
> > • Aggregated sources of soil organic matter, which form important parts of soil matrices;

> • Structural elements of the landscape that influence hydrologic and geomorphic processes within aquatic and terrestrial ecosystems;
> • Significant modifiers of microclimatic regimes in the post-disturbance ecosystem; and, most profoundly
> • Habitat for a large array of animals, including the majority of vertebrate and large numbers of invertebrate species.
> Large snags and logs are generated by natural mortality processes in living forests that include mature and old trees, continually replenishing this important resource."

…

"Retention of large snags and logs are specifically relevant to Northern Spotted Owl since these structures provide the habitat that sustains most of the owl's forest-based prey species."

However, the report does not adequately address the adverse effects of commercial logging (however well-intentioned) in terms of capturing mortality and reducing recruitment of ecologically important dead wood functions. This online slideshow shows the modeled effects of thinning on dead wood habitat which are significant and long-term. http://www.slideshare.net/dougoh/effects-of-logging-on-dead-wood-habitat Would treating up to 2/3 of the dry (and mixed) forest landscape (0.5% of the dry landscape per year) allow for recruitment of adequate levels of dead wood and dense forest patches? This needs to be modeled. Modeling fire hazard is one framework, but what about habitat for species that prefer dense forests and complex understory and dead wood? "The landscape" needs to be defined – does it include private lands?

In the Johnson/Franklin report, the conflicts between different aspects of restoration are acknowledged by not resolved. ("Further, we acknowledge that there are tensions among the different elements of a comprehensive restoration program.") e.g.,

(a) thinning helps grow big trees faster but captures mortality and significantly reduces recruitment of dead wood which is essential for meeting both riparian and upland habitat objectives;

(b) logging requires heavy equipment and road construction which detract from restoration objectives;

(c) commercial logging reduces forest carbon storage (with the possible exception of projects involving removal of the smallest fuels from low elevation pine forests with the most frequent fire regimes);

(d) removal of commercial sized trees can and canopy reduction can make fire hazard worse by making stands hotter, dryer, windier and stimulating the growth of future surface and ladder fuels;

The Johnson/Franklin framework for analyzing climate change and carbon storage framework is unsupported.

First, because the report fails to explicitly integrate and harmonize climate resiliency and carbon storage. The authors is seem to allow climate change adaptation to trump climate change mitigation. A quantitative risk assessment needs to be conducted to help answer the question of how much habitat and carbon can be sacrificed in the short- and mid-term, in order to hedge the long-term speculative risks associated with climate change. The authors make an unsupported assertion that "wildfire and insect … threats will probably develop very quickly as the result of climate change."

Second, the report erroneously concludes that the carbon effects of logging are "unsettled." Mitchell & Harmon (2009) provide a compelling finding that although an extensive thinning program can influence fire behavior, the agencies are likely to remove more carbon by logging than will be saved by avoiding fire. Mitchell, Harmon, O'Connell. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems. Ecological Applications. 19(3), 2009, pp. 643–655 http://ecoinformatics.oregonstate.edu/new/FuelRedux_FS_CStorage_Revision2.pdf Other analyses with differing conclusions, have obvious methodological problems, most often they forget that fire is unpredictable so fuel treatments can never be timed and located with precision, which means that many acres are logged (and carbon depleted) unnecessarily.

Third, the report says that the carbon storage benefits of unmanaged forests are only "short-term," when in fact they are also "long-term." Just because most forests will eventually burn does not mean that logging will prevent such fires, or will result in any carbon benefits. The cumulative results of delayed carbon loss across large unmanaged areas is long-term carbon storage across the mosaic of burned and unburned areas.

Fourth, the authors justify lumping mixed forests with dry forests based on an unsupported assertion that forests with historic mixed-severity fire regimes "will shift to more frequent and severe fire regimes with climate change." This ignores the effects of ongoing fire suppression, especially in the extensive areas of checkerboard ownership in SW Oregon. In addition, there is countervailing evidence such as the fact that severe fire effects are closely related to near surface wind speeds, which are declining in the Northern Hemisphere. Tim R. Mcvicar And Michael L. Roderick 2010. Winds Of Change - On average, terrestrial near-surface winds have slowed down in recent decades. nature geoscience | VOL 3 | Nov. 2010.

The Johnson/Franklin report dismisses the findings in the most recent USFS Forest Inventory Analysis (FIA) report which found prevailing concerns fire hazard to be overstated (Donnegan et al. 2008), but resolution of the different views on this topic requires much fuller analysis and discussion than found in this report.

Unresolved questions about forest restoration may require an EIS.

Since this is a pilot project with scientists involved, it is a good opportunity to address the following unresolved questions that seem to come up again and again, especially when considering dry forests:

a. How can we balance the need to thin overly dense forests in order to grow more big trees and the need to provide habitat for species that depend on dead wood and high canopy cover? This is a particular concern in terms of species associated with dead wood and those associated with complex riparian areas. There is evidence that capturing mortality has adverse consequences for these species that have not been fully integrated into our management approaches. Some might argue that our forests are suffering more from a lack of management, but we would strenuously argue that our forests are still more threatened by too much of the wrong forms of management, past, present and future (roading, logging, grazing, mining, fire suppression) and there is still too little recognition of this.

b. How can we balance the competing effects of canopy removal that both reduces fire hazard by reducing canopy bulk density and increases fire hazard by making the stand hotter, dryer, and windier? Canopy reduction has competing effects on fuels and microclimate that need to be more carefully examined. Recognizing that "The fire environment is thus an integration of the effects of all of its components" (Countryman 1972) the agencies lack a comprehensive model that integrates the effects of logging on both fuel structure (rearranging fuels, moving the canopy to the ground) and microclimate (making the stand hotter, dryer, windier). "The evaluation of biomass removal alternatives on fire potential is complex and many-faceted. … Treatments can alter many aspects of a stand and thus of fire potential. … In fact, fuels and fire potential change dynamically and continuously— and not always consistently. The relative success of treatments in reducing fire potential may change as stands and fuels develop. … In the long run, opening a stand and removing biomass alters stand dynamics and fuel dynamics. Effects on potential fire behavior may vary with time since treatment …" Reinhardt, Elizabeth D.; Holsinger, Lisa; Keane, Robert 2010. Effects of biomass removal treatments on stand-level fire characteristics in major forest types of the northern Rocky Mountains. Western Journal of Applied Forestry. 25(1): 34-41. http://www.fs.fed.us/rm/pubs_other/rmrs_2010_reinhardt_e001.pdf

c. How do we integrate and balance terrestrial and aquatic restoration objectives which can sometime be in conflict. Terrestrial restoration often involve manipulation of vegetation, while aquatic restoration more often benefits from minimal anthropogenic ground disturbance. Terrestrial restoration often requires road systems which are almost universally harmful to aquatic systems.

d. Is fire-regime condition-class (FRCC) a sound basis for describing and prioritizing fuel treatments. FRCC is a widely used tool which assumes that "time since fire" is an accurate indicator of fire hazard, but there is conflicting evidence showing that closed canopy forests that develop in the absence of fire can help suppress the growth of surface and ladder fuels and maintain a cool, moist microclimate that helps reduce fire hazard. Dense canopy cover might actually help suppress fire rather than spread it. See Odion, D.C., E.J. Frost, J.R. Strittholt, H. Jiang, D.A. DellaSala and M.A. Moritz. 2004. Patterns of fire severity and forest conditions in the western Klamath

Mountains, California. Conservation Biology 18(4): 927-936.
http://nature.berkeley.edu/moritzlab/docs/Odion_etal_2004.pdf

e. How much dead wood habitat should we be leaving, and how do we ensure that enough is provided through time? The current forest plan standards for snag-associated wildlife (based on "biological potential") are scientifically outdated and need to be updated. DecAID is a start, but it has its own limitations and DecAID has not been officially adopted as a management standard with appropriate tolerance levels clearly specified for each land allocation. See
* Franklin, J.F., Lindenmayer, D., MacMahon, J.A., McKee, A., Magnuson, J., Perry, D.A., Waide, R., and Foster, D. 2000. Threads of Continuity. Conservation Biology in Practice. [Malden, MA] Blackwell Science, Inc. 1(1) pp9-16.
* William F. Laudenslayer, Jr., Patrick J. Shea, Bradley E. Valentine, C. Phillip Weatherspoon, and Thomas E. Lisle Technical Coordinators. Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests. PSW-GTR-181.
http://www.fs.fed.us/psw/publications/documents/gtr-181/
* Lofroth, Eric. 1998. The dead wood cycle. In: Conservation biology principles for forested landscapes. Edited by J. Voller and S. Harrison. UBC Press, Vancouver, B.C. pp. 185-214. 243 p.
http://www.for.gov.bc.ca/hre/deadwood/DTrol.htm
* Rose, C.L., Marcot, B.G., Mellen, T.K., Ohmann, J.L., Waddell, K.L., Lindely, D.L., and B. Schrieber. 2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 in Wildlife-Habitat Relationships in Oregon and Washington (Johnson, D. H. and T. A. O'Neil. OSU Press. 2001)
http://web.archive.org/web/20060708035905/http://www.nwhi.org/inc/data/GISdata/docs/chapter24.pdf
* Stevens, Victoria. 1997. The ecological role of coarse woody debris: an overview of the ecological importance of CWD in B.C. forests. Res. Br., B.C. Min. For., Victoria, B.C. Work. Pap. 30/1997.
http://www.for.gov.bc.ca/hfd/pubs/docs/Wp/Wp30.pdf
* Hagar, Joan, 2007, Assessment and management of dead-wood habitat: USGS Administrative Report 20071054, pp. 1-32.
http://pubs.usgs.gov/of/2007/1054/pdf/ofr20071054.pdf

f. Our understanding of mortality processes in dry forests is still limited, so as we switch from human-dominated disturbance regimes back to more natural disturbance regimes, how many medium-sized trees do we need to retain in order to achieve desired levels of future old growth structure? The final recovery plan for the spotted owl recommends retention of large populations of medium-sized trees for recruitment as future large trees, both live and dead. See

* USFWS. 2008 Final Recovery Plan for the Northern Spotted Owl. http://www.fws.gov/pacific/ecoservices/endangered/recovery/NSORecoveryplanning.htm

* K. Norm Johnson, Jerry Franklin, Debora Johnson. The Klamath Tribes' Forest Management Plan. Dec 2003. http://www.klamathtribes.org/forestplan.htm

g. What are the full benefits of variability both within and between stands? Variability is not only good for habitat, but is also an under-appreciated way to moderate fire behavior.

* Kevin W. Zobrist. 2005. A literature review of management practices to support increased biodiversity in intensively managed Douglas-fir plantations. Final Technical Report to the National Commission on Science for Sustainable Forestry (NCSSF). http://www.ncseonline.org/ewebeditpro/items/O62F7175.pdf

* Poage, Nathan, J. 2005, Variability in Older Forest Structure in Western Oregon. U.S. Geological Survey, Open-file Report 2005-1385, 28 p.

* SÁNDOR BARTHA et al. 2004. On the Importance of Fine-Scale Spatial Complexity in Vegetation Restoration Studies. International Journal of Ecology and Environmental Sciences 30: 101-116, 2004 http://www.zpok.hu/img_upload/cb39111eba7a31c9c0e48686fa8e3c87/IJEES2004.pdf

* Franklin J.F.; Van Pelt R. 2004. Spatial Aspects of Structural Complexity in Old-Growth Forests. Journal of Forestry, Volume 102, Number 3, April/May 2004, pp. 22-28(7).

* Lutz. J.A. 2005. The Contribution of Mortality to Early Coniferous Forest Development. MS Thesis. University of Washington. http://faculty.washington.edu/chalpern/Lutz_2005.pdf

* Carey, Andrew B., Janet Kershner, Brian Biswell, and Laura Dominguez de Toledo. 1999. Ecological Scale and Forest Development: Squirrels, Dietary Fungi, and Vascular Plants in Managed and Unmanaged Forests. Wildlife Monographs, No 142, Supplement to the Journal of Wildlife Management, Vol. 63 No. 1, January 1999. http://www.fs.fed.us/pnw/pubs/journals/pnw_1999_carey003.pdf

* Andrew B. Carey, Constance A. Harrington; Small mammals in young forests: implications for management for sustainability; Forest Ecology and Management (2001) 154(1-2): 289-309; http://www.fs.fed.us/pnw/pubs/journals/pnw_2001_carey003.pdf

* Kevin Shear Mccann, The diversity–stability debate. Nature 405, 228 - 233 (11 May 2000). http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v405/n6783/full/405228a0_fs.html
* USFWS. 2008 Final Recovery Plan for the Northern Spotted Owl. http://www.fws.gov/pacific/ecoservices/endangered/recovery/NSORecoveryplanning.htm

h. How can we balance the unavoidable adverse impacts of logging, roads, activity fuels, weeds, etc. versus the rather uncertain benefits of fuel reduction? Fuel reduction may have little or no beneficial effect on low severity fires (which are largely controlled by favorable weather conditions) or high severity fires (which are largely controlled by unfavorable weather conditions). What is the actual likelihood that favorable fire will occur any given stand during the relatively brief time period that fuel hazard is reduced by treatments? And, if fire does occur, will there be a good match between the actual forest type, the actual fuel treatment, and the actual weather conditions? See William L. Baker, Jonathan J. Rhodes. 2008. Fire Probability, Fuel Treatment Effectiveness and Ecological Tradeoffs in Western U.S. Public Forests. pp.1-7 (7). The Open Forest Science Journal, Volume 1. 2008. http://www.bentham-open.org/pages/gen.php?file=1TOFSCIJ.pdf
i. How effective will restoration treatments be in the long run unless we address the underlying causes of forest health problems, such as fire suppression, livestock grazing, roads, as well as top-down influences such as CO_2 enrichment and climate change.
j. How do we determine the appropriate mix of park-like stands and denser stands? How do we merge limited snapshot views of historic conditions into an accurate picture of the full range of historic conditions? Could low density forest conditions be at least partially a lingering artifact of native American burning practices? Is the current densification of forests partly related to climate change and CO_2 enrichment? What is the "future range of variability" in light of climate change? How do we manage dry forests to be both resilient to disturbance and to store lots of carbon in order to help mitigate climate change? See Baker, W.L., T.T. Veblen and R.L. Sherriff (2006). Fire, fuels, and restoration of ponderosa pine-Douglas-fir forests in the Rocky Mountains, USA. Journal of Biogeography. 2006.
k. When commercial logging is used as a tool to accomplish restoration, how can we ensure that we don't remove the very building blocks of forest health? There is evidence that commercial logging objectives can conflict with the attainment of objectives for both habitat and fire hazard. Are there other ways to pay for restoration that relies less on removing structure from the forest?

See USDA PNW Research. Science Findings, Issue 85. http://www.fs.fed.us/pnw/sciencef/scifi85.pdf

l. What scales and pace of restoration is needed to maintain viable populations of native wildlife, or conversely, what do we have to do on federal lands to compensate for what is occurring on non-federal forest lands? What scales and pace of treatment can be tolerated across the landscape while still maintaining viable populations of native fish & wildlife?
m. How to appropriately integrate management before, during, and after disturbance. Right now our efforts are very dis-integrated. We try to restore forests to be more fire adapted, while we continue to aggressively suppress fire and remove valuable structural legacies after fire. This makes no sense.
n. The agency often claims that fuel reduction logging improves habitat for species dependent on old growth forests, such as spotted owls, pileated woodpeckers, and goshawks. The claim is that by reducing fire hazard logging improves forest conditions over the long term, but recent research shows that fuel reduction logging has a significant cost in terms of reduced carbon storage. Even if logging reduces fire hazard there is less carbon stored in the logged forest than is stored in a burned forest. See Mitchell, Harmon, O'Connell. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems. Ecological Applications. 19(3), 2009, pp. 643–655 http://ecoinformatics.oregonstate.edu/new/FuelRedux_FS_CStorage_Revision2.pdf Although thinning can affect fire, the agencies are likely to remove more carbon (and habitat) by logging than will be saved by avoiding fire. Forest carbon biomass is a rough proxy for wildlife habitat, soil quality, and other forest values, maybe even water quality. This brings into question the agency's frequent claims that they are saving the forest by logging it. The agency especially must recognize that carbon biomass is a meaningful proxy for wildlife habitat, especially for species associated with structurally complex mature and old-growth forest, so the NEPA analysis needs to disclose the likely adverse consequences of logging in terms of loss of complex wood structure in these forests. See detailed discussion below.

These questions are not intended to doubt the need for restoration but rather to refine the focus of restoration and improve methods. The NEPA analysis should consider a full range of NEPA alternatives to illuminate and explore these unresolved issues.

Logging habitat to save it from fire.

When logging will reduce the quality of habitat, the NEPA analysis must include some evaluation of the probability that fuel reduction treatments will interact favorably with fire, which requires an estimate of the probability of future wildfire. To assume a 100%

chance of fire is to vastly over-estimate the ecological value of fuel treatments and under-estimate the ecological effects of logging on habitat. See Heiken, D. 2010. Log it to save it? The search for an ecological rationale for fuel reduction logging in Spotted Owl habitat. Oregon Wild. v 1.0. May 2010. http://dl.dropbox.com/u/47741/Heiken%2C%20Log%20it%20to%20save%20it%20v.1.0.doc

There is a strong interest among the federal land management agencies to conduct widespread logging in suitable spotted owl habitat in order to reduce the effect of fire. The agencies view fuel reduction logging as beneficial to owl habitat because modeling shows that fire behavior is moderated by fuel reduction, but proponents never seem to conduct a careful evaluation of the relative probability, and the relative harms, of logging versus wildfire. Strangely, the probabilistic aspects of this issue have been largely ignored in the owl science literature, but recently explored in the forest-carbon literature which recently showed that although thinning can modify fire behavior, logging to reduce fire effects is likely to remove more carbon by logging than will be saved by modifying fire. Mitchell, Harmon, O'Connell. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems. Ecological Applications. 19(3), 2009, pp. 643–655 http://ecoinformatics.oregonstate.edu/new/FuelRedux_FS_CStorage_Revision2.pdf The reason for this seemingly counterintuitive outcome is a result of the "law of averages." As explained by Cathcart et al 2009 —

> The question is—if the implementation of fuels treatments within the Drews Creek watershed had the beneficial effect of reducing the likelihood of wildfire intensity and extent as simulated in this study, why is the expected carbon offset from fuels treatment so negative? The answer lies in the probabilistic nature of wildfire. Fuels treatment comes with a carbon loss from biomass removal and prescribed fire with a probability of 1. In contrast, the benefit of avoided wildfire emissions is probabilistic. The law of averages is heavily influenced that given a wildfire ignition somewhere within the watershed, the probability that a stand is not burned by the corresponding wildfire is 0.98 (1 minus the average overall conditional burn probability …
>
> > Thus, the expected benefit of avoided wildfire emissions is an average that includes the predominant scenario that no wildfire reaches the stand. And if the predominate scenario for each stand is that the fire never reaches it, there is no avoided CO2 emissions benefit to be had from treatment. So even though severe wildfire can be a significant CO2 emissions event, its chance of occurring and reaching a given stand relative to where the wildfire started is still very low, with or without fuel treatments on the landscape.

Jim Cathcart, Alan A. Ager, Andrew McMahan, Mark Finney, and Brian Watt 2009. Carbon Benefits from Fuel Treatments. USDA Forest Service Proceedings RMRS-P-61. 2010. http://www.fs.fed.us/rm/pubs/rmrs_p061/rmrs_p061_061_079.pdf

Both carbon and spotted owl habitat tend to accumulate in relatively dense forests with intermediate or longer fire return intervals. Thus, we can likely read these studies and replace the word "carbon" with the word "spotted owl habitat" and the results will likely hold.

In an effort to advance the discussion and help the agencies conduct better risk assessments in the NEPA context we have prepared the attached white paper in an attempt to clarify the critical considerations in a probabilistic risk assessment that compares the risk of logging versus wildfire. Heiken, D. 2010. Log it to save it? The search for an ecological rationale for fuel reduction logging in Spotted Owl habitat. Oregon Wild. v 1.0. May 2010. http://dl.dropbox.com/u/47741/Heiken%2C%20Log%20it%20to%20save%20it%20v.1.0.doc

To justify such fuel reduction logging in suitable owl habitat on ecological grounds requires several findings: (1) that wildfire is highly likely to occur at the site of the treatment, (2) that if fire does occur it is likely to be a severe stand-replacing event, and (3) that spotted owls are more likely to be harmed and imperiled by wildfire than by logging at a scale necessary to reduce fire hazard. Available evidence does not support any of these findings, which raises serious questions about the need for and efficacy of logging to reduce fuels in western Oregon and other forests lacking frequent fire return intervals.

The probabilistic element of the risk equation demands careful consideration. Both logging and fire have meaningful consequences, so the issue really boils down to a comparative probabilistic risk assessment where risk is characterized by two quantities: (1) the magnitude (severity) of the possible adverse consequence(s), and (2) the likelihood (probability) of occurrence of each consequence.

Framework for Assessing the Risk of Wildfire vs Fuel Reduction Logging			
	Likelihood of event	Magnitude of harm	Net Benefit
Wildfire	LOW: Stand replacing wildfire is not common in western Oregon. Fire suppression policy prevails. The chance that any given acre of forest will experience wildfire is low.	LOW: The majority of wildfire effects are not stand replacing. Fire is a natural process to which native wildlife are adapted. There is still a deficit of natural fire processes on the landscape.	Fire is likely less harmful to habitat than fuel reduction logging.
Logging	HIGH: To be effective in controlling fire, logging must be very extensive, and sustained. Many more acres would need to be logged than would burn.	HIGH: Widespread logging will have significant impacts on canopy, microclimate, understory vegetation, down wood, and long-term effects on recruitment of large trees and snags.	Fuel reduction logging is likely more harmful to habitat than wildfire.

The white paper is organized around these risk evaluation parameters.

In spite of what we often hear, that federal forests are not at imminent risk of destruction by wildfire. Fire return intervals remain relatively long, due to both natural factors and active fire suppression policies. Wildfire severity also remains moderate. Most wildfires are NOT stand replacing. Most fires are in fact low and moderate severity.

The location, timing, and severity of future fire events cannot be predicted making it difficult to determine which forests will benefit from treatment - consequently fuel treatments must be extensive and many stands will be treated unnecessarily, thus incurring all the costs of fuel logging, but receiving none of the beneficial effects on fire behavior.

Furthermore, logging for purposes of fuel reduction has impacts on owl and prey habitat that remain under-appreciated, especially the reduction of complex woody structure, and the long-term reduction in recruitment of large snags and dead wood. Fuel reduction logging also has complex effects on fire hazard with potential to increase fire hazard, especially when fuel reduction efforts involve removal of canopy trees.

When all this evidence is put together, it becomes clear that "saving" the spotted owl by logging its habitat to reduce fuels often does not make any sense.

Similar conclusions were reached by The Wildlife Society (TWS) peer review of the 2010 Draft Recovery Plan for the Spotted Owl. The draft plan called for extensive logging to reduce fire hazard (“inaction is not an option”). TWS used state-and-transition model to evaluate the effects of opening dry forests to reduce fire hazard versus the effects of wildfire.

> The results of running the model with 2/3rds of the landscape treated leads to open forest becoming predominant after a couple of decades, occupying 51 percent of the forested landscape, while mature, closed forest drops to 29 and 24 percent of the Klamath and dry Cascades forests, respectively (Appendix A, Figure 5, shows the Cascades). Treatments that maintain open forests in 2/3rds of the landscape put such a limit on the amount of closed forest that can occur, even if high severity fires were to be completely eliminated under this scenario, there would only be 35 percent of the landscape occupied by closed forests. In contrast, to the extensive treatment scenario, treating only 20 percent of the landscape reduces mature, closed canopy forest by about 11 percent (Appendix A, Figure 6).
>
> One justification for the extensive treatment scenario promoted in the 2010 DRRP is that it is needed because of increased fire hypothesized to occur under climate change. By doubling the rate of high severity fire by 2050 with 2/3rds of the landscape treated, closed canopy forest is reduced to 25 percent in the Klamath compared to 60 percent without treatment and 23 percent in the dry Cascades compared to 54 percent without treatment.
>
> Under what scenario might treatments that open forest canopies lead to more closed canopy spotted owl habitat? The direct cost to close forests with treatments that open them is simply equal to the proportion of the landscape that is treated. This reduction in closed canopy forest can only be offset over time if the ratio of forest regrowth to stand-replacing fire is below 1 (5-8 times more fire than today), and shifts to above 1 with the treatments (and most or all standreplacing fire in treated sites is eliminated, as modeled here). Another scenario that allows closed forests to increase would be if treating small areas eliminated essentially all future standreplacing fire, not only in treated areas, but across the entire landscape. This

> scenario obviously relies on substantially greater control over fire than is currently feasible, and it would increase impacts of fire exclusion if effective.
> …
> In sum, to recognize effects of fire and treatments on future amounts of closed forest habitat, it is necessary to explicitly and simultaneously consider the rates of fire, forest recruitment, and forest treatment over time, which has not yet been done by the Service.
> …
> The potential impacts of fuel treatments on spotted owls are not considered. … We also know little about the impacts of fire, yet this has been treated as a major threat, leading to proposing more fuel treatments. However, it is uncertain at this time which is a bigger threats, fires or treatments to reduce risk of fires. … If the plan intends to use the best available science to describe ongoing impacts to spotted owl habitat, information and literature about disturbances to reduce fuels should be included.
> … there has been no formal accounting of how closed canopy forests can be maintained with the widespread treatments that are being proposed.

The Wildlife Society 2010. Peer Review of the Draft Revised Recovery Plan for Northern Spotted Owl. November 15, 2010.
http://www.fws.gov/oregonfwo/Species/Data/NorthernSpottedOwl/Recovery/Library/Documents/TWSDraftRPReview.pdf

Do not rely on the flawed analysis in LOWD v Allen in which the 9th Circuit strangely gave the FS deference NOT on a question of forestry, but on a question of risk assessment, an area in which they do not have special expertise. Unlike the majority opinion, the dissent actually perceived the logical flaw in the FS risk assessment. That is, the FS assumed (and the majority bought this assumption) a 100% chance of fire in the period after logging. In reality the risk of wildfire is far less than 100%, while the risk that logging will downgrade spotted owl habitat is virtually certain and will last for 20-50 years. The FS never weighed these effects in any logical risk framework.

The dissent in LOWD v Allen said:

> "To pick Alternative C because it is 40 percent less likely to result in a crown fire when there is a fire without a determination that includes the actual number of ignitions per year in the forest or some actual evaluation of the risk of fire unjustifiably weighs fire prevention above-and-beyond all other factors. The NWFP's Standards and Guidelines specifically require a "greater assurance" of long-term maintenance. NWFP S & Gs at C-13. Greater is a relative term that requires comparison. Without quantifying actual risk a comparison is not possible. The Forest Service's conflicting statements of fire risk, in my view, are arbitrary, and its failure to comply with the NWFP Standards and Guidelines' requirement that it compare costs and benefits is capricious.
> …
> Without providing a basis for the level of assumed fire risk, it is impossible to say

> that a 40 percent reduction in risk justifies the guaranteed risk of commercial logging: the destruction of 618 acres of owl habitat for 20-50 years. Logging within late-successional forests inside a LSR is permitted only where the proposed logging is not just needed, but rather clearly needed to reduce risks. The NWFP's Standards and Guidelines squarely place the burden on the Forest Service to establish that an exception to the general prohibition on logging applies."

Now there is support for Mitchell and Harmon (2009) from Alan Ager and the WESTCARB Project:

> … [A] team of researchers tried to quantify how removing smaller fuels from forests and conducting prescribed burns helps stave off intense wildfires and reduces greenhouse gas emissions. …
>
> "The take-home message is we could not find a greenhouse gas benefit from treating forests to reduce the risk of fire," said John Kadyszewski, the principal investigator for the terrestrial sequestration projects of the West Coast Regional Carbon Sequestration Partnership. WESTCARB, ...
>
> As part of Kadyszewski's work, his team directly compared the carbon stocks in about 6,000 acres of forests in Shasta County, Calif., and Lake County, Ore., before and after applying forest management treatments to reduce the risk of severe wildfires, such as prescribed burns and thinning. Then, based on modeled projections, they found that if a wildfire ignited on treated lands rather than untreated lands, there would generally be lower emissions. That was the good news.
>
> But there was a catch: knowing where fires might happen.
>
> Since there is a relatively low risk of fire at any one site, large areas need to be treated -- which release their own emissions in the treatment process. The researchers have concluded that the expected emissions from treatments to reduce fire risk exceed the projected emissions benefits of treatment for individual projects.

Dina Fine Maron 2010. FORESTS: Researchers find carbon offsets aren't justified for removing understory (E&E Report 08/19/2010).

The reason for this seemingly counterintuitive outcome is a result of the "law of averages." As explained by Cathcart et al (2009) —

> The question is—if the implementation of fuels treatments within the Drews Creek watershed had the beneficial effect of reducing the likelihood of wildfire intensity and extent as simulated in this study, why is the expected carbon offset from fuels treatment so negative? The answer lies in the probabilistic nature of wildfire. Fuels treatment comes with a carbon loss from biomass removal and prescribed fire with a probability of 1. In contrast, the benefit of avoided wildfire emissions is probabilistic. The law of averages is heavily influenced that given a wildfire ignition somewhere within the watershed, the probability that a stand is

> not burned by the corresponding wildfire is 0.98 (1 minus the average overall conditional burn probability …
>
> Thus, the expected benefit of avoided wildfire emissions is an average that includes the predominant scenario that no wildfire reaches the stand. And if the predominate scenario for each stand is that the fire never reaches it, there is no avoided CO2 emissions benefit to be had from treatment. So even though severe wildfire can be a significant CO2 emissions event, its chance of occurring and reaching a given stand relative to where the wildfire started is still very low, with or without fuel treatments on the landscape.

Jim Cathcart, Alan A. Ager, Andrew McMahan, Mark Finney, and Brian Watt 2009. Carbon Benefits from Fuel Treatments. USDA Forest Service Proceedings RMRS-P-61. 2010. http://www.fs.fed.us/rm/pubs/rmrs_p061/rmrs_p061_061_079.pdf

And we can reliably replace the word "carbon" with virtually any other forest value that depends on dense forests with relatively high accumulations of dead wood, e.g. spotted owls, flying squirrels, goshawk, marten, pileated woodpecker, etc. and we get the same result. To wit ...

"Since there is a relatively low risk of fire at any one site, large areas need to be treated -- which *[degrades habitat values for dense forests and dead wood]* in the treatment process. The researchers have concluded that the expected *[habitat loss]* from treatments to reduce fire risk exceed the projected *[habitat]* benefits of treatment for individual projects."

Sincerely,

Doug Heiken

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